

~~DRAFT - ENHANCEMENT AREA ASSESSMENTS & STRATEGIES~~

Aquaculture: Assessment

Section 309 Programmatic Objective

- I. Enhance existing procedures and long range planning processes for considering the siting of public and private marine aquaculture facilities in the coastal zone.
- II. Improve program policies and standards which affect aquaculture activities and uses so as to facilitate siting while ensuring the protection of coastal resources and waters.

Resource Characterization

1. Briefly describe the state's aquaculture activities.

Definition

Virginia's 1992 Aquaculture Development Act defines aquaculture as the "propagation, rearing, enhancement, and harvest of aquatic organisms in controlled or selected environments, conducted in marine, estuarine, brackish or fresh water." Marine aquaculture represents Virginia's fastest growing industry and 85 percent of the total revenues of the aquaculture industry. The majority of marine aquaculture conducted in Virginia involves clams, oysters and soft-shell crabs. The industry has grown slightly since the last assessment. Furthermore, there has been extensive research and several programs have been implemented in an attempt to further restore the industry.

State Programs, Regulations, Statutes, and Guidelines

Aquaculture farmers are not required to have a license to grow in Virginia; however, numerous agencies are responsible for regulating portions of marine aquaculture activities. The Virginia Department of Agriculture and Consumer Services (VDACS) is the lead agency in the state for aquaculture development and has responsibility for ensuring that facilities used to process and package food fish and shellfish are sanitary. The Virginia Marine Resources Commission (VMRC) primarily regulates the location of marine aquaculture activities through existing laws and regulations pertaining to fisheries and habitat, particularly submerged land leases and permits. The Department of Environmental Quality (DEQ) has responsibility for issuing Pollution Discharge Elimination System permits, which may be required for aquaculture facilities that discharge into state waters. The Virginia Department of Health (VDH) issues permits that ensure the safety of seafood for human consumption. In addition, local governments may require business licenses and construction permits for the development of aquaculture facilities.

Economic Value

The Virginia Agricultural Statistics Service (VASS) completed the most recent survey on commercial aquaculture in 2003, collecting information on amounts harvested, gross profits, and projected growth for the next year. Clams remained the largest and most profitable cultured species in Virginia, but oyster farming appears to be growing the most rapidly. Clam and oyster harvests are triple what they were eight years ago. (These numbers do not reflect oyster gardening, either for environmental purposes or personal consumption.)

Aquaculture Type	1995 Harvest Count/Gross/ Avg. Price	1997 Harvest Count/Gross/ Avg. Price	2003 Harvest Count/Gross/ Avg. Price	2004 Harvest Projections
Hard Clams	43,710,000 \$6,993,600 \$0.16	52,426,931 \$11,049,000 \$0.17	139,832,637 \$20,327,255 \$0.15	113% increase
Oysters	259,000 \$62,160 \$0.24	308,411 \$85,832 \$0.28	859,209 \$212,721 \$0.25	301% increase
Soft-Shell Crabs	417,705 dozen \$4,840,142 \$0.24	499,651 dozen \$7,083,347 \$14.18	241,442 dozen \$3,368,739 \$13.95	105% increase
All other species (e.g. seed clams and oysters)	N/a \$1,159,000	N/a \$1,176,176	N/a \$2,646,934	N/a

Although the clam industry in Virginia continues to grow, it appears to have begun to produce more than the market has dictated. The introduction of federal crop insurance in 1998 has encouraged more people on the Eastern Shore to get involved in clam farming. The result has been very low market prices for clams. In fact, Cherrystone Aquafarms reports selling clams for less than they did 20 years ago and 25% less than in 1998.

Waters and Lands

Public: Marine aquaculture typically involves the use of State-owned submerged lands or the waters overlying the public bottom. Virginia has a long history of leasing previously “unproductive” submerged lands to individuals for the purpose of planting oysters. The use of public submerged lands and waters present potential use conflicts but also the potential for mutually beneficial public/private partnerships.

Private: During the past few decades, some individuals and corporations have used their privately leased submerged land to grow out hatchery or nursery-reared oysters and hard clams. There also has been significant recent growth in noncommercial oyster gardening. The Virginia Institute of Marine Science (VIMS) estimates about 2,000 people in the state are growing between 1000 and 5000 oysters each for environmental purposes (water quality improvement) and personal consumption, which together constitute a significant economic impact. Disease-resistant oyster seed is purchased from commercial hatcheries, and floats are either purchased as a unit or built from purchased materials.

Current Aquaculture Research Issues

Non-Native Species: Virginia’s native oyster population has been in rapid decline since the 1950s, due to the parasites MSX and Dermo as well as over-harvesting, loss of habitat, and pollution. As an attempt to stimulate the declining industry commercial oyster industry, studies introducing non-native oysters to Virginia waters have been happening since the early 1990s. The most recent and promising species is *C. ariakensis*- commonly referred to as Asian oysters. Studies have found these oysters grow rapidly, are highly resistant to MSX and Dermo, and are commercially viable. However, scientists are still concerned about their interaction with native oysters and their ability to survive among the predators of Virginia’s coastal waters. The Virginia Coastal Program partially funded the study *Non-Native Oysters in the Chesapeake Bay*, completed by the National Academy of Science. The study looked at three possible

management options: 1) Prohibit introduction of non-native species, 2) Allow open water aquaculture of sterile non-native oysters, 3) Introduce reproductive non-native oysters. The study concluded option 2 as the most suitable for two main reasons. First, it allows for more time to study the biology of the non-native oyster, its impact on the Bay, and the most proper way to manage its introduction. Second, it lessens the risk of introducing non-native species illegally.

Reef Building: Since its inception in 1999, the Virginia Oyster Heritage Program (initiated by the Virginia Coastal Program) has successfully constructed over 80 oyster reefs in the waters of the Chesapeake Bay and the seaside of Virginia's Eastern Shore, providing the resources necessary for oyster settlement and growth. These reefs are often populated with disease-resistant oysters from commercial hatcheries as well as noncommercial oyster gardeners.

Disease Resistant Strains: In March and April of 2005, a collaboration of federal, regional, and state agencies placed 15 million disease resistant oysters into the Great Wicomico River. The goal is for the oysters to spawn during summer 2005, and survive the diseases that usually kill oysters within 2-3 years. Previous large scale restoration efforts in the Rappahannock River focused on providing reef structure with some seeding using disease-resistant strains. The Wicomico experiment is using much larger numbers of disease-resistant strains in a smaller river system in hopes that oysters will not cross-breed with local strains, thereby retaining their disease-resistant qualities. Results to date have not been promising.

2. Briefly describe environmental concerns. Also, describe any use conflicts (e.g., navigational, aesthetic, incompatible uses, public access, recreation), and future threats (e.g., shoreline defense works, introduced species).

A study commissioned by the Coastal Program, undertaken by VIMS scientists, identified the following environmental concerns, use conflicts and future threats. A second effort undertaken through the Seaside Heritage Program began development of Best Management Practices that address these issues. Both are described in the Management Characterization section. (*See below.*)

Environmental Concerns

Water Quality and Nutrient Dynamics: Nitrogen levels in Virginia's coastal waters, especially the Chesapeake Bay, are higher than they should be. Clam aquaculture does help to reduce nitrogen levels and improve water quality, although not as efficiently as oysters. Clams take in nitrogen by feeding on phytoplankton, which in essence removes nitrogen from the water, thereby improving water quality. However, through respiration, a portion of that nitrogen is released back into the water as ammonia and nitrate.

Waste Management: Waste from aquaculture farms has been identified as a new environmental concern. Poles, sandbags, netting, rebar, and other materials are often neglected or lost and are found washed up on shore or lodged on the bottom. The greatest environmental concern, however, is the plastic netting used to cover the clam beds. This netting gets torn, lost, or forgotten and often lands on shorelines or floats free where it can harm various aquatic life. The Virginia Eastern Shorekeeper, a non-profit partially funded by the Coastal Program's Seaside Heritage Program, has mapped locations of this netting on the Eastern Shore and is currently looking at what happens to this netting once it is discarded. However, the types and extent of actual harm to aquatic habitat have yet to be fully studied or characterized.

Clean water is critical to the shellfish growing industry. However, growers themselves may contribute to contamination of water quality through fuel/oil leaks from their boats, or other practices that contaminate water.

Use Conflicts

Impact on Submerged Aquatic Vegetation (SAV): Habitat for clams and SAV can overlap slightly. Although clams are often raised in the shallower, intertidal zone, they also thrive in slightly deeper waters. SAV is usually found in deeper waters, but can find its way into shallower water in areas where water quality and clarity have been improved by the clams. Currently, clam aquaculture is not permitted where SAV already exists, but is permitted if the clams were there first and SAV came in later. However, there is question as to whether this will continue in the future. SAV restoration is a priority for Virginia. If shellfish growers are required to relocate in the future, the industry could be significantly impaired. This conflict was initially detailed in the Coastal Program-funded VIMS study, “*Shallow Water Resource Use Conflicts: Clam Aquaculture and Submerged Aquatic Vegetation.*”

Threats to Biodiversity: This is an unquantified threat, however, there is concern that clam aquaculture may be eliminating biodiversity by turning large areas of benthic bottom into a monoculture. More research and data will be needed to determine if this is a serious threat and, if so, causes and potential solutions. Through the Coastal Program’s Seaside Heritage Program, biologists from VIMS and the Center for Conservation Biology are studying potential use conflicts between clam farming and shorebird habitat.

Aesthetics: Aesthetics has become a major new issue on the Eastern Shore. Sting Rays can devastate a clam crop, so clam growers often protect their plot with PVC pipes or rebar that protrude above the water, sometimes spaced only one foot apart. While the grower’s lease is for the bottom and they technically have no legal rights (see “Management Characterization” below) to impact areas above water, this is difficult to enforce. The conflict is greatest on the Eastern Shore between shellfish growers and homeowners/vacationers who view the rebar or PVC as unsightly. This situation is exacerbated when new property owners are not informed of aquaculture activities occurring near their property prior to purchase.

Future Threats

New Harvesting Methods: Experts foresee that new harvesting methods will be developed in future years and that, in the absence of regulation about harvesting methods as well as the absence of an industry association that could monitor and self-regulate harvesting, these new methods are likely to affect clam health, benthic communities, water column turbidity, and nutrient levels. This is an issue that bears attention by the state.

Introduced Species and Disease Management: One significant threat arises from diseased shellfish moving from disease endemic areas to disease free areas. This can happen when a grower discovers the presence of a disease and attempts to move his stock before it becomes completely infected. The movement of shellfish may also introduce disease across state boundaries along the Atlantic or other waterways, which is nearly impossible to regulate. For example, clams introduced from South Carolina and Florida have a greater susceptibility to the

disease Quahog Parasite Unknown (QPX). While permits are required through VMRC to bring clams from these infected waters, enforcement is nearly impossible.

Management Characterization

1. Identify significant changes in the state's ability to address the planning for and siting of aquaculture facilities since the last Assessment (new regulations, guidance, manuals, etc.).

Provide the following information for each change:

- **Characterize the scope of the change**
- **Describe recent trends**
- **Identify impediments to addressing the change**
- **Identify successes**

The principle management challenge confronting Virginia is to ensure suitable places for aquaculture in the future and that conflicts with other uses and resources are minimized. Contributing to this challenge is the collapse of the Virginia Shellfish Growers Association in December of 2003, which has left the industry without a self-governing body.

Water Column Leasing

For more than a decade there has been interest in expanding shellfish aquaculture activities into the water column through the use of floats, racks and trays. The improper siting of such structures has the potential to interfere with more traditional uses of the water such as fishing, navigation and recreation. As a part of a grant provided by the Coastal Program for Aquaculture Management, the Virginia Marine Resources Commission (VMRC) developed a proposal to create a water column leasing program in Virginia. The amendment, *Water Column Leases for Aquaculture Purposes*, authorizes VMRC to "lease the water column above certain state-owned bottomlands for aquacultural purposes." On April 15, 2004, the Virginia General Assembly approved the amendment to Chapter 16, Title 28.2 of the state code. Once funded, this amendment would have provided the aquaculture industry with necessary water rights and protection while minimizing potential conflicts with other user groups and existing natural resources. However, the bill was only effective if the General Assembly earmarked state funding for the specific purpose. As of July 1, 2005, funding was not provided for fiscal year 2006.

Best Management Practices (BMPs) for Shellfish Aquaculture

Through the Coastal Program's Seaside Heritage Program, VIMS scientists began developing Best Management Practices (BMPs) for Shellfish Aquaculture in 2003. The lack of a central group to facilitate "buy in" from the various aquaculturists makes implementing industry-wide changes quite difficult. This list of BMPs attempts to address the environmental concerns, use conflicts, and future threats to the aquaculture industry. With funding from the Coastal Program, the Virginia Eastern Shorekeeper will work with individual clam farmers to persuade them to adopt these practices.

- *Nutrient Dynamics:* Two BMPs are associated with nutrient dynamics: 1) Develop ways to understand the "equilibrium" number of clams to grow in a tributary, creek, or bay that filters out nitrogen and minimizes additional seaweed growth; 2) Control overgrowth of algae and seaweed by removing it and depositing it upland.)

- *Water Quality*: Self-report and control water quality issues associated with aquaculture.
- *Waste Management*: “If you bring it into the system, you bring it out.” Shellfish farmers should ensure that all tools and materials used in the water for their livelihood are removed from the water when no longer being used.
- *Impact on Submerged Aquatic Vegetation (SAV)*: A sustainable balance between these two uses of estuarine bottomlands should be strived for. Studies will need to be done to understand what that balance is and how to determine it on a case-by-case basis.
- *Threats to Biodiversity*: More studies to be done. As the extent of how different farming practices affect biodiversity is better understood, action should be taken to prevent it.
- *Aesthetics*: There should be a balance between safety and aesthetics. All BMPs regarding aesthetics will have to be developed on a site-by-site basis.
- *New Harvesting Methods*: New methods of harvesting should be rigorously reviewed to understand their impacts on shellfish, the Bay, and other species. Once new methods have been reviewed, specific BMPs can be developed for them.
- *Introduced Species and Disease Management*: Growers should be required to adhere to VMRC inter-coastal water regulations. Long term: Develop a better understanding of the genetics of shellfish stock and susceptibility to disease.

Conclusion

1. Identify priority needs or major gaps in addressing the programmatic objectives for this enhancement area that could be addressed through a 309 Strategy.

Several needs and gaps must be addressed if aquaculture is to continue to grow in Virginia. Perhaps the most significant gap is the lack of funding for the legislation that enables leasing of a water column. Without funding for this program, the industry will continue to be faced with use conflicts that cannot be resolved.

The consumption of contaminated oysters from private oyster gardens is also a concern. Although oyster gardeners are required to register with VMRC, this is not always enforced. Without an enforced permitting process, it is difficult for health officials to know where oyster gardening is occurring and the magnitude of risk from oysters consumed from oyster gardens. The Tidewater Oyster Gardeners Association (TOGA) provides annual workshops and newsletter information on the risks of oyster consumption to its members but not all oyster gardeners are members of oyster gardening associations. Increased water quality monitoring combined with continued educational efforts are necessary to maintain public health.

There is a need to further refine the Aquaculture BMPs developed by VIMS so that they can be applied at specific locations. There also is a gap between those BMPs and the ability to get industry buy-in and compliance with them. A mechanism will need to be developed to educate people and enforce compliance. The development of an Aquaculture License in Virginia, while

bound to spark controversy, could offer a way to ensure that growers are conforming to regulations.

To protect the aquaculture industry from encroaching coastal development, a Development BMP handbook could direct attention to the need for more intensive Development BMPs near aquaculture activities, and could recommend that local governments and planning districts consider the creation of “aquaculture overlay districts” which would require more intensive BMPs. These districts can be created by designating an Environmentally Sensitive Zone adjacent to aquaculture areas. While these districts are already available as a planning tool, localities may need more education in how to put them in place.

Another major issue is the threat of development along Virginia’s coast, especially the Eastern Shore. New developments along the shoreline are making it increasingly difficult for aquaculturists to make a living. New housing development and more traffic causes more polluted runoff to enter waterways which can be extremely harmful to shallow clam beds. A cooperative effort between state and local governments could help develop mutually beneficial solutions to this issue.

There is also concern from within the industry that subleasing is becoming more and more of an issue. The availability of intertidal areas suitable for clam aquaculture is becoming scarcer as the industry grows. Many people, who have held leases for aquaculture for years, have stopped practicing aquaculture themselves. Instead, they sublease at a large mark-up, hindering the ability of clam aquaculturists to make a profit. The state grants the original lease for only \$1.50 per acre. However, the sublease mark-up is often over \$10,000 per acre. This is allowing private individuals to capitalize on what is the “public trust.” VMRC could find new revenue for enforcing its regulations and implementing the Water Column Aquaculture Lease program by increasing the cost of a lease and eliminating the practice of subleasing.

Virginia remains committed to the expansion of aquaculture in coastal waters as a mechanism for establishing sustainable fisheries. The previous assessment stated that a lack of consistent action would minimize opportunities for aquaculture to grow. The next steps could involve actually developing an enforceable plan for aquaculture that uses the aquaculture site suitability model, the 3-d leasing permit, and the BMPs developed with Coastal Program funding to create a productive, orderly, reliable, and efficient aquaculture industry.

2. What priority was this area previously and what priority is it now for developing a 309 Strategy and designating 309 funding and why?

<u>1997 Assessment</u>		<u>Last Assessment (2000)</u>		<u>This Assessment (2005)</u>	
High	<u>✓</u>	High	<u>✓</u>	High	<u>✓</u>
Medium	<u> </u>	Medium	<u> </u>	Medium	<u> </u>
Low	<u> </u>	Low	<u> </u>	Low	<u> </u>

Implementation of the changes proposed in the previous Section 309 strategy for aquaculture remains a high priority for the Coastal Policy Team. Water-column leasing permits for aquaculture and industry-wide recognition of Aquaculture Best Management Practices will be important aspects to the healthy growth of the industry.